

## Two new millipede genera from northwest Tasmania, Australia (Diplopoda: Polydesmida: Dalodesmidae)

ROBERT MESIBOV

Queen Victoria Museum and Art Gallery, Launceston, Tasmania, Australia 7250. E-mail: mesibov@southcom.com.au

### Abstract

*Setoisenoton pallidus* n. gen., n. sp. and *Dysmicodesmus jeekeli* n. gen., n. sp. occupy small ranges (<5000 km<sup>2</sup>) in the forests of northwest Tasmania. Both have a head+19 rings, metatergites lacking posterior corner extensions, and long, rigid gonopod telopodites reaching at least to legpair 4 when retracted. *S. pallidus* resembles *Notonesiotes aucklandensis* Johns, 1970 from the subantarctic Auckland Islands, but differs in gonopod details. *D. jeekeli* is unusual in the Tasmanian dalodesmid fauna in having basally fused telopodites.

**Key words:** Diplopoda, Polydesmida, Dalodesmidae, Australia, Tasmania

### Introduction

In five species of small dalodesmid Polydesmida from northwest Tasmania with a head+19 body rings (H+19), males have unusually long gonopod telopodites, reaching at least to legpair 4 when retracted. Three of these species, in the genus *Ginglymodesmus* Mesibov, 2005, have a midlength pseudo-articulation in the telopodite which allows the distal portion to flex anteriorly (Mesibov 2005). The fourth and fifth species both have rigid, straight telopodites and are here described and placed in new genera. One of the new species superficially resembles *Notonesiotes aucklandensis* Johns, 1970, a dalodesmid from the subantarctic Auckland Islands. The second new species superficially resembles species in the dalodesmid genus *Tasmaniosoma* Verhoeff, 1936.

### Methods

'Male' and 'female' in the text refer to stadium 7 adults. Specimens are preserved in 80% ethanol. Gonopods were cleared in 80% lactic acid and temporarily mounted in 60% lactic acid for microscopic examination. Preliminary drawings on graph paper were made using an eyepiece grid at 160X on a binocular microscope. Photomicrographs were taken with a Canon EOS 1000D digital SLR camera mounted on a Nikon SMZ800 binocular dissecting microscope equipped with a beam splitter. Measurements were made with the same microscope using an eyepiece scale. An FEI Quanta 600 ESEM operated in high-vacuum mode was used to examine preserved material which had been air-dried before sputter-coating with gold. All images and drawings were prepared for publication using GIMP 2.6 software.

Locality details are given with latitude and longitude based on the WGS84 datum. Most localities also have a UTM grid reference (grid zone 55G) based on the AGD66 datum, because these are the coordinates most often written on 20th century specimen labels in Tasmania. Abbreviations: AM = Australian Museum, Sydney; ANIC = Australian National Insect Collection, Canberra; NRCP = National Rainforest Conservation Program; QVM = Queen Victoria Museum and Art Gallery, Launceston; Tas = Tasmania.

## Taxonomy

### Order Polydesmida Pocock, 1887

### Suborder Dalodesmidea Hoffman, 1980

### Family Dalodesmidae Cook, 1896

### *Setoisenoton*, n. gen.

**Type species.** *S. pallidus*, n. sp., here designated.

**Diagnosis.** Small H+19 dalodesmids (ca 5 mm long) with long, straight, non-fused gonopod telopodites ending in a two-process claw in the longitudinal plane, with the prostatic groove terminating in the anterior process.

**Etymology.** *Setoisenoton* is *Notonesiotes* spelled backwards, and points to the contrasting positions of the solenomere in the two genera (see Remarks and Fig. 2); masculine gender.

**Remarks.** The new species described here resembles the H+19 dalodesmid *Notonesiotes aucklandensis* Johns, 1970 in non-gonopod details, and in both species the gonopod telopodite ends in a two-element claw. *N. aucklandensis* is known only from the subantarctic Auckland Islands (ca 50°S 166°E), where it is said to be widespread (Johns 1970). Jeekel (2006) redescribed *N. aucklandensis* from Auckland Island specimens collected during the Pacific Expedition (1914–1916) of Theodor Mortensen (Zoological Museum, University of Copenhagen). Jeekel showed that in *N. aucklandensis* the prostatic groove terminates on the posterior process of the claw (Fig. 2C). Peter Johns (in litt., 27 July 2010) has very kindly confirmed Jeekel's description and provided me with a photomicrograph of the telopodite of a male *N. aucklandensis* in the Canterbury Museum (collected at Magnetic Station Cove, Adams Island, Auckland Islands, January 1966); the prostatic groove is clearly visible in the image as it enters the posterior process.

The prostatic groove terminates on the anterior process in the species described here (Figs 2A, 2B). If the Tasmanian and Auckland Islands species are closely related, then the prostatic groove has moved from one process to the other within this lineage. I favour the alternative and more conservative view that the two species are not closely related, and that the telopodite similarity is the result of convergent evolution.

### *Setoisenoton pallidus*, n. sp.

Figs 1A, 2A, 2B, 3A, 3B; map Fig. 5

**Holotype.** Male. Australia, Tasmania, 5 km S of Renison Bell, 41°50'S 145°25'E (CP680670) ±1 km, 1 May 1987, N. Platnick, R. Raven and T. Churchill, Berlese [extraction method], rainforest litter, QVM 23:51859.

**Paratypes.** 15 males, same details as holotype, QVM 23:51794.

**Other material examined.** 44 males, Bubs Hill, Tas, 42°07'S 145°46'E (CP982367) ±1 km, 28 April 1987, N. Platnick, R. Raven and T. Churchill, Berlese, QVM 23:51791; 2 males, Mt Rufus, Tas, 42°08'S 146°06'E (DP250350) ±5 km, 29 April 1987, N. Platnick, R. Raven and T. Churchill, QVM 23:51792; 10 males, 6 km SE of Strahan, Tas, 42°11'S 145°21'E (CP640280) ±1 km, 30 April 1987, N. Platnick, R. Raven and T. Churchill, Berlese, QVM 23:51793; 1 male, Andrew River Caves area, Tas, 42°20'S 145°44'E ±5 km, M.R. Gray and S. Eberhard, March 1988, AM KS96000; 4 males, Anthony Road, Tas, 41°49'48"S 145°37'17"E (CP854680) ±100 m, 21 April 1989, NRCP personnel, QVM 23:51795; 1 male, Pelion Hut, 3 km S of Mt Oakleigh, Tas, 41°50'S 146°03'E ±1 km, 30 November 1990, I.D. Naumann, sifted *Poa*, ANIC 64-000194; 2 males, Vale of Belvoir, Tas, site 11, 41°33'04"S 145°53'32"E (DP075993) ±50 m, 17 March 2010, K. Bonham, QVM 23:51810.

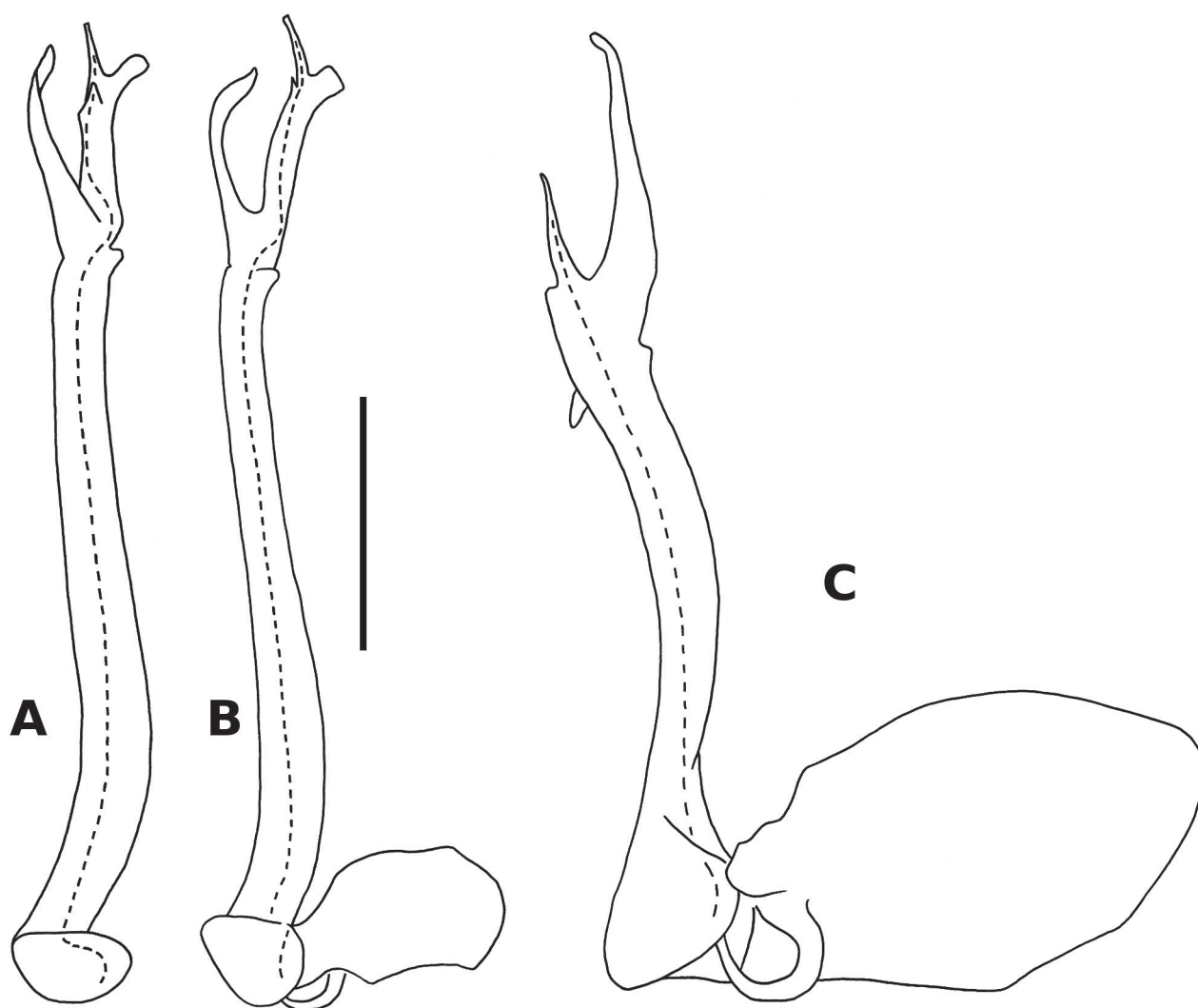
**Description.** Male approximate measurements: length 5 mm, ring 12 prozonite width 0.5 mm, ring 12 maximum width across paranota 0.6 mm. Recently preserved specimens (QVM 23:51810) uniformly pale (Fig. 1A).



**FIGURE 1.** (A) *Setoisenoton pallidus* **n. gen., n. sp.**, male ex QVM 23:51810. (B) *Dysmicodesmus jeekeli* **n. gen., n. sp.**, paratype male ex QVM 23:51843. (C) *D. jeekeli*, right lateral view of gonopods in situ, dissected male ex QVM 23:51824. Scale bars: (A), (B) = 2.5 mm; (C) = 0.5 mm.

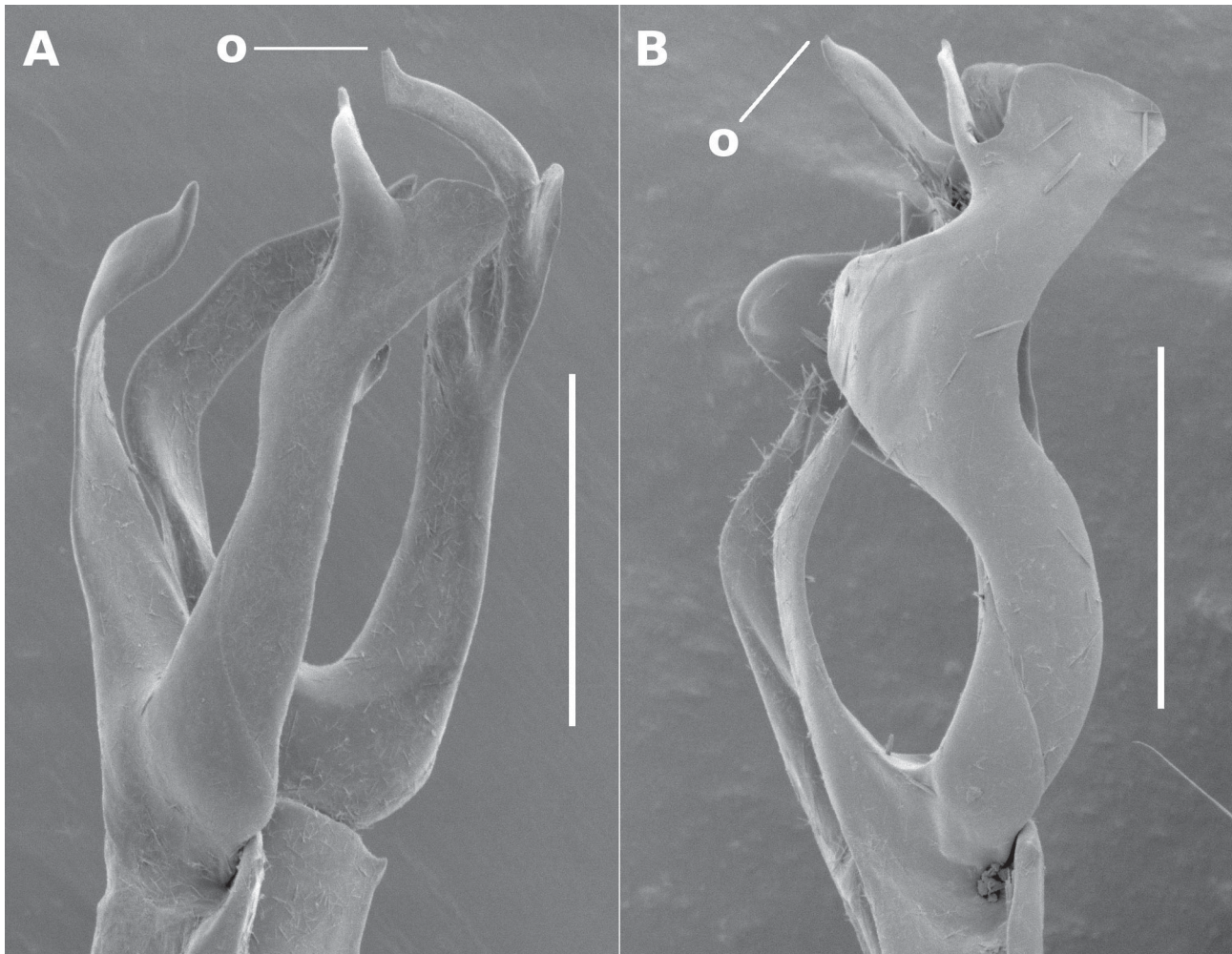
Male with head  $1\frac{1}{3}X$  as wide as collum; head sparsely setose, vertigial sulcus not apparent; antennal sockets separated by ca  $1.7X$  socket diameter, slightly impressed. Antenna clavate, short, barely reaching ring 3 when manually extended; antennomere 6 widest; relative antennomere lengths  $(2,3,6) > (4,5,7/8)$ . Collum reniform (convex anteriorly). Tergite 3 shorter than tergites 2, 4; tergites 2, 4 much shorter than metatergite 5. Relative overall widths ring  $6 > (5, \text{head}) > 4 > (3, 2, \text{collum})$ ; metatergite widths 6–13 about equal, gradually decreasing 14–18. Ring 2 tergal margin slightly below collum and ring 3 margins; ring 2 laterally with ventral surface concave, but without discrete pit. Waist on diplosegments shallow, without longitudinal ridges; suture well defined. Prozonite and metatergite smooth with flat polygonal texture, in places (notably on metazonite between suture and metatergite) with one side of each cuticular polygon slightly raised. Metatergite with

transverse furrow indistinct and with three transverse rows of short, blunt setae. Paranota not swollen, lateral margin thin, nearly level, at about 2/3 ring height in lateral view; anterior margin nearly straight, with small, convex anterolateral shoulder leading to nearly straight lateral margin; 1–3 short setae on lateral margin but no apparent notches; posterolateral corner not produced on anterior rings, but with small, rounded corner tooth on last few rings, bearing very small seta. Limbus composed of flat, irregularly shaped, apically toothed tabs. Spiracles small with circular, slightly raised rims; on diplosegments with anterior spiracle just above anterior leg and with posterior spiracle just above and about midway between anterior and posterior leg bases. Ozopore small, round, near posterolateral corner of metatergite; pore formula 5, 7, 9, 10, 12, 13, 15–18. Sternites about as long as wide, lightly setose, with deep transverse and very shallow longitudinal impressions. Legs with prefemur swollen dorsally, femur less so, swelling maximal on legpairs 3–7. Leg 6 with relative podomere lengths tarsus>(prefemur, femur)>>(tibia, postfemur); tarsus 1.3X as long as femur, nearly straight; femur proportionally longer on posterior legs. Leg 6 with brush setae and sphaerotrichomes tapering, pointed; sphaerotrichomes on postfemur, tibia, tarsus; brush setae on femur, prefemur. Gonopore on slight distomedial bulge of leg 2 coxa. Bases of legpairs 6 and 7 well separated, of legpair 5 slightly separated; coxae of legpairs 4–7 moderately setose medially; no sternal processes or setal brushes. Pre-anal ring lightly setose, hypoproct subtrapezoidal, epiproct rounded-triangular, extending well past anal valves. Spinnerets in square array with ventral pair in shallow recess.



**FIGURE 2.** (A) Posterior and slightly medial and (B) medial views of right gonopod of *Setoisenoton pallidus* **n. gen., n. sp.**, paratype male ex QVM 23:51794. (C) Medial view of right gonopod of *Notonesiotes aucklandensis* Johns, 1970, redrawn from Fig. 5 in Jeekel (2006). Setation not shown; long dashed lines indicate course of prostatic groove. Scale bar for (A) and (B) = 0.25 mm.





**FIGURE 3.** *Setoisenoton pallidus* n. gen., n. sp., left lateral views of tips of gonopod telopodites: (A) paratype male ex QVM 23:51794, (B) male ex QVM 23:51793. Left gonopod in foreground, right gonopod in background, anterior to right; o = opening of prostatic groove on right telopodite; scale bars = 0.1 mm.

Gonopod aperture ovoid, ca 1/2 width of prozonite, rim raised posterolaterally on either side. Gonocoxa small, subcylindrical, with a few short setae distally on anterior and posterior surfaces, very lightly joined medially. Cannula prominent, inserting low on posteromedial side of telopodite base. Telopodites straight, closely parallel, reaching legpair 3 when retracted. Base of telopodite (Figs 2A, 2B) small, ovoid, the long distal portion of the telopodite arising from the anterolateral side of the base and leaning slightly medially from that point. Telopodite (Figs 2A, 2B) divided at ca 3/4 height into (1) a flattened, bluntly pointed, posterior process, directed posterodistally and curving anterodistally; and (2) a slightly flattened, anterior solenomere, longer than posterior process, curving distally, dividing at ca 3/4 solenomere length into a posterior, narrow, strap-like branch bearing the opening of the prostatic groove, and an anterior, expanded, mediolaterally flattened tab with a slightly convex outer edge. Solenomere also with a very small, pointed projection arising posteromedially just below the division into strap and tab. Telopodite also with a small quadrate tab on the anteromedial side of the division between posterior process and solenomere. Prostatic groove running on posteromedial side of telopodite to anterior side of base of solenomere. A few short setae on posterior surface of telopodite base and distal portion of telopodite to 1/3 – 1/2 telopodite height; posteromedial surface of base (near cannula entry) densely and finely setose.

Female not yet recognised (see Remarks).

**Distribution.** Known from wet eucalypt forest, cool temperate rainforest and subalpine scrub at eight sites over ca 3500 km<sup>2</sup> in northwest Tasmania (Fig. 5).

**Etymology.** Named for the pale colour of all known specimens.

**Remarks.** In males from Strahan (Fig. 3B), Andrew River and the Vale of Belvoir, the solenomere is sinuously curved and bears a rounded, tab-like extension of the posterior surface, and the posterior process of the telopodite is smaller than in males from the type locality (Fig. 3A) and Anthony Road. Telopodites in males from Bubs Hill and Mt Rufus are intermediate in structure, and I regard this variation as intraspecific and possibly clinal.

*S. pallidus* co-occurs with several undescribed species of small, pale, H+19 dalodesmids with similar metatergite shape and setation, and no *S. pallidus* males have been found in copula. For these reasons I am not yet able to assign females to this species.

### ***Dysmicodesmus*, n. gen.**

**Type species.** *D. jeekeli*, n. sp., here designated.

**Diagnosis.** Small H+19 dalodesmids (males <10 mm long) with three transverse rows of low tubercles on each metatergite, and with long, straight, basally fused telopodites terminating in a cluster of processes, with the solenomere bearing minute, irregular, lumpy growths adjoining the prostatic groove.

**Etymology.** Greek *dysmikos*, 'western', + -desmus, commonly used suffix for genus names in Polydesmida, masculine gender.

### ***Dysmicodesmus jeekeli*, n. sp.**

Figs 1B, 1C, 4A–D; map Fig. 5

**Holotype.** Male. Australia, Tasmania, Blackwater Road, 41°10'18"S 144°55'45"E ±25 m, 170 m, 14 June 2010, R. Mesibov, QVM 23:51826.

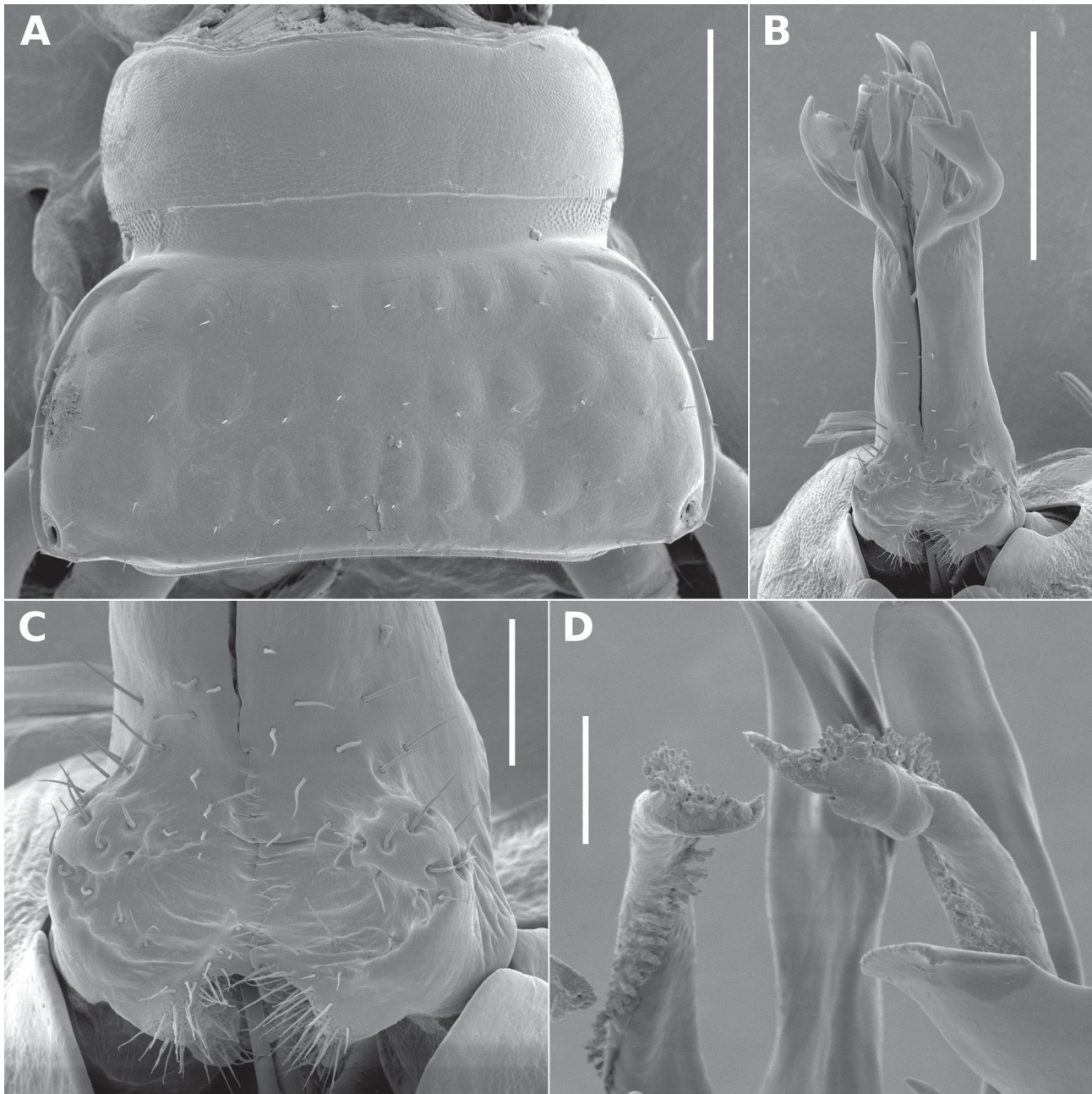
**Paratypes.** 3 males, 1 female, same details as holotype, QVM 23:51843.

**Other material examined.** 4 males, Anthony Road, Tas, 41°49'48"S 145°37'17"E (CP854680) ±100 m, 840 m, 18 April 1989, NRCP personnel, QVM 23:51855; 1 male, same details but 21 April 1989, QVM 23:51857; 2 males, Savage River Pipeline Road, Tas, 41°18'40"S 145°16'47"E ±1 km (pooled specimens from CP558247 and CP560255, ca 800 m apart; latitude-longitude is midway between the two sites), 500 m, 20 April 1989, NRCP personnel, QVM 23:51856; 1 male, 1 female, Bond Tier, Tas, 40°57'41"S 144°51'16"E ±50 m, 100 m, 20 May 2010, R. Mesibov, QVM 23:51824, found in copula; 2 males, same details but ±100 m and 23 May 2010, QVM 23:51825.

**Description.** Male/female approximate measurements: length 9/8 mm, ring 12 prozonite width 0.9/0.9 mm, ring 12 maximum width across paranota 1.2/1.2 mm. Freshly preserved specimens (Fig. 1B) reddish-brown, lighter dorsally and on paranota; head, antennae and pre-anal ring light brown, antennae darker distally; legs pale, light brown distally.

Male with head 1 1/3X as wide as collum; frons and ventral 2/3 of vertex moderately setose; vertigial sulcus very weakly impressed but clearly marked with dark pigment in freshly preserved specimens, extending ventrally ca 2/3 of the way to top of antennal sockets; antennal sockets separated by ca 2X a socket diameter, slightly impressed, bordered laterally with slight depression, ventral side of depression swollen. Antenna clavate, short, reaching ring 3 when manually extended; antennomere 6 widest; relative antennomere lengths (3,6)>2>(4,5). Collum reniform (convex anteriorly). Tergites 2–4 much shorter than metatergite 5; relative overall widths ring 6>5>head>4>(3,2)>collum; metatergite widths 6–13 about equal, gradually decreasing 14–18. Ring 2 tergal margin very slightly below collum and ring 3 margins; no ventral pit on ring 2. Diplosegments (Fig. 4A) with waist shallow but well-defined behind suture, without longitudinal ridges; prozonites and metazonites smooth, with flat, polygonal texture; metatergites without evident transverse furrow, and with 3 transverse rows of 10–12 low tubercles, round or slightly oblong (long axis longitudinal), tubercles less obvious on paranota, each tubercle with short seta near posterior edge; posterior metatergite

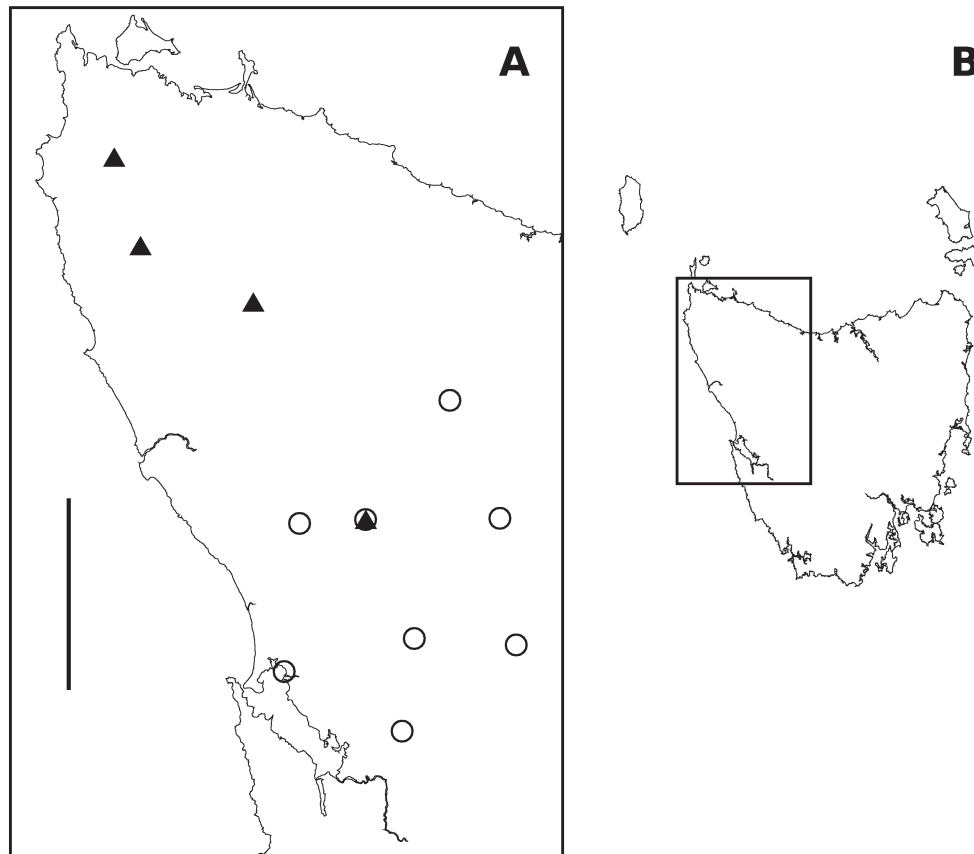




**FIGURE 4.** *Dysmicodesmus jeekeli* n. gen., n. sp., paratype male ex QVM 23:51843. (A) Dorsal view of ring 12; (B) posterior view of gonopods in situ; (C) magnified view as in (B) showing basal fusion of telopodites; (D) magnified view as in (B) showing lumpy growths on solenomeres. Scale bars: (A), (B) = 0.5 mm; (C) = 0.1 mm; (D) = 0.05 mm.

margin with a few short setae. Paranota a little swollen, lateral margin thin, nearly level, at about 3/4 ring height in lateral view; anterior margin smoothly convex, without anterolateral shoulder; lateral margin gently convex, not obviously notched, bearing 2–3 very short lateral setae; posterolateral corner not produced, gently rounded, in line with straight posterior margin of metatergite, on some rings with small, rounded, seta-bearing tooth just medial to posterolateral corner. Limbus composed of flat, irregularly shaped, apically toothed tabs. Spiracles small with circular, slightly raised rims; on diplosegments with anterior spiracle just above anterior leg, posterior spiracle just above and midway between anterior and posterior leg bases. Ozopore small, round, near posterolateral corner of metatergite, slightly recessed; pore formula 5, 7, 9, 10, 12, 13, 15–18. Sternites about as long as wide, lightly setose, with deep transverse and shallow longitudinal impressions. Legs with prefemur swollen dorsally, femur less so, swelling maximal on legpairs 4–7. Leg 6 with relative podomere

lengths tarsus>(prefemur, femur)>(tibia, postfemur); tarsus 1.5X as long as femur, nearly straight; femur proportionally longer on posterior legs. Leg 6 with brush setae and sphaerotrichomes tapering, pointed; brush setae on femur, prefemur and distal half of coxa/trochanter; sphaerotrichomes on postfemur, tibia, tarsus; sphaerotrichome shafts longer distally. Gonopore on distomedial bulge of leg 2 coxa, protected distally by semi-cylindrical cowl. Bases of legpairs 5–7 separated to accommodate retracted gonopods, legpair 4 bases also separated but less so; sternite adjoining coxa of legs 4–7 produced as low knob bearing cluster of short setae medially. Pre-anal ring lightly setose, hypoproct subtrapezoidal, epiproct small, rounded, extending slightly past anal valves. Spinnerets in square array with ventral pair in shallow recess.



**FIGURE 5.** (A) Localities for *Dysmicodesmus jeekeli* **n. gen., n. sp.** (triangles) and *Setoisenoton pallidus* **n. gen., n. sp.** (open circles); scale bar = 50 km. (B) Tasmania showing location of localities map. Mercator projections.

Gonopod aperture ovoid, ca 1/3 width of prozonite, posterolateral corners raised. Gonocoxae short (between 1/4 and 1/3 as long as telopodite), narrow, truncated conical, not medially joined. Cannula prominent, inserting posteromedially on telopodite base. Telopodites (Figs 1C, 4B) straight, reaching between legpairs 3 and 4 when retracted, basally tightly fused along a suture (Fig. 4C), lightly fused medially to ca 1/3 telopodite height at a series of small, discrete, cuticular joints. Telopodite swollen just above base, the swelling protruding slightly posterodistally; a lobe-like smaller swelling on anterior telopodite surface at ca 1/4 telopodite height, directed slightly basally (Fig. 1C). Telopodite divided at ca 2/3 height into cluster of 4 processes: (1) a rod-like, tapering, bluntly pointed solenomere arising posteromedially, curving first laterally, then medially, then posteromedially, with minute, irregularly shaped, lumpy growths along prostatic groove (Fig. 4D); (2) a slightly flattened, tapering and bluntly pointed process arising anteriorly, bending posteriorly near base and curving slightly medially near tip, almost meeting the corresponding contralateral process, longer than the solenomere; (3) a flattened process arising posterolaterally and curving distally, the tip expanded, truncate and with a shallow, rounded notch laterally, the process shorter than the solenomere; (4) a small, slightly flattened process arising posteriorly just basal to solenomere, directed posterodistally and tapering to a point at about 1/2 solenomere height. Prostatic groove running on medial surface of telopodite to



base of solenomere, then winding helically around solenomere to tip. A few scattered setae posteriorly to ca 1/3 telopodite height; telopodite densely and finely setose around posteromedial depression into which cannula inserts.

Female slightly shorter than male but about the same diameter; legs smaller and not swollen; epigynum about 1/2 ring width, posterior margin with medial projection shaped like inverted U; cyphopods not examined.

**Distribution.** Known from wet eucalypt forest and cool temperate rainforest at four localities over a narrow range ca 120 km long in northwest Tasmania (Fig. 5).

**Etymology.** In honour of the myriapodologist C.A.W. Jeekel (1922–2010), for his many contributions to the systematics of Australian millipedes.

**Remarks.** I found the nine 2010 specimens in curls of recently fallen (i.e. not yet rotted) branch bark from mature *Eucalyptus obliqua* trees, suggesting that adults of this species are arboreal. Across its range, *D. jeekeli* shares this microhabitat with *Tasmaniosoma compitale* Mesibov, 2010 and *T. hickmanorum* Mesibov, 2010, both of which it resembles in having strong colouration, three transverse rows of low tubercles on metatergites, a cowl-like shield on the male gonopore and a gonopod telopodite tipped with a cluster of processes (Mesibov 2010). However, *D. jeekeli* is distinct from all 19 described species of *Tasmaniosoma* in the basal fusion of its telopodites and the unusual decoration of the solenomere.

## Acknowledgements

I thank Norman Platnick (American Museum of Natural History) for permission to deposit in QVMAG the specimens from his 1987 collecting trip to Tasmania, Karsten Goemann (Central Science Laboratory, University of Tasmania) for assistance with SEM imaging, and editor Alessandro Minelli and an anonymous reviewer for suggestions on improving the paper. I am especially grateful to Peter Johns (West Melton, New Zealand) for examining and imaging for me a male of his *Notonesiotes aucklandensis* in the Canterbury Museum.

## Literature cited

- Jeekel, C.A.W. (2006) Notes on four Dalodesmidae (Diplopoda, Polydesmida) from New Zealand. *Myriapod Memoranda*, 8, 15–26.
- Johns, P.M. (1970) New genera of New Zealand Dalodesmidae (Diplopoda). *Transactions of the Royal Society of New Zealand*, 12(20), 217–237.
- Mesibov, R. (2005) A new genus of millipede (Diplopoda: Polydesmida: Dalodesmidae) with a pseudo-articulated gonopod telopodite. *Zootaxa*, 1064, 39–49.
- Mesibov, R. (2010) The millipede genus *Tasmaniosoma* Verhoeff, 1936 (Diplopoda: Polydesmida: Dalodesmidae) from Tasmania, Australia, with descriptions of 18 new species. *ZooKeys*, 41, 31–80.